

## LIQUID TANK LINER CONNECTION

### BACKGROUND OF THE INVENTION

5           This invention relates to connections for a liner in a tank containing liquids. More particularly, it refers to connections to a flexible, non-molded liner mounted within a liquid storage vessel.

10           In potable hot water tanks, it is necessary to provide a flexible, non-molded liner which is resistant to corrosive attack from salts and other materials in the water. As set forth in U.S. 4,981,112, incorporated herein by reference, the prior art uses a bolt or flange on the water tank exterior at an inlet and outlet port to form a seal with each of

15           corresponding inlet and outlet ports on the liner. Such a flexible, non-molded liner can be replaced by unbolting the bolt or flange on the water tank exterior. However, the connection of a replacement liner is cumbersome and difficult to install. A more easily mountable means of installing a

20           flexible, non-molded liner in a liquid containing tank is needed.

### SUMMARY OF THE INVENTION

25           The present invention provides a connection to easily mount a top portion of a flexible, non-molded liner to an inner surface of a tank containing a liquid. The connection employs a plate having at least two outwardly projecting studs and at

least one liquid conducting tube passing through the plate.  
The upper portion of the flexible, non-molded liner is pressed  
between the plate and the inner surface of the tank adjacent an  
annular opening. A tank head flange or an externally threaded  
5 pipe is welded to an outside of the tank adjacent the annular  
opening. A flange cap or threaded insert is tightened down  
over the studs to lock the flexible liner in place.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention is best understood by those having ordinary  
10 skill in the art by reference to the following detailed  
description when considered in conjunction with the  
accompanying drawings in which:

FIG. 1 is a perspective view of a tank containing the  
liner connection of this invention.

15 FIG. 2 is an exploded view of the components used in the  
connection.

FIG. 3 is a cross sectional view along line 3-3 in FIG. 1.

FIG. 4 is a perspective view of a tank containing an  
alternate connection for the liner.

20 FIG. 5 is an enlarged view of a connection for the liner  
in the FIG.4 tank.

FIG. 6 is an exploded view of the components used in the  
connection shown in FIG. 5.

FIG. 7 is a cross sectional view along line 7-7 in FIG. 5.

## DETAILED DESCRIPTION OF THE BEST MODE

Throughout the following detailed description, the same reference numerals refer to the same elements in all figures.

Referring to FIGS. 1 and 2, the tank 10 has a connection 12 to allow ingress and egress of a liquid to or from the tank through tubes 14 and 16 passing through plate 18 into the interior of the tank 10. Multiple threaded studs 20 project from plate 18. Additional tubes could pass through plate 18, if needed.

A top portion of liner 22 abuts an inside surface of tank head 24. The liner 22 has a central annular opening 28 that is aligned with, but smaller than, central annular opening 26 in tank head 24. A tank head flange 30 has a collar 32 that is welded 34 adjacent to annular opening 26.

As seen in FIG. 3, a flange cap 36 has an upper annular flange 38 integral with, but spaced apart from, a lower annular flange 40. An O-ring 42 is located between the lower annular flange 40 and the liner 22. Studs 20 mounted on flange plate 18 pass through holes 44 in liner 22 and through holes 46 in lower flange 40 of the flange cap 36 and then are affixed in place by a nut 48. The upper annular flange 38 of flange cap 36 is attached by bolts 56 and nuts 58 to the annular tank head flange 30 through holes 50 in flange cap 36 and through holes 52 in tank head flange 30. Annular opening 54 inside lower

flange 40 of the flange cap 36 is about the same diameter as opening 28 in the liner 22. Therefore, lower flange 40 seats on the top portion of liner 22 around opening 28 whereas upper flange 38 of the flange cap 36 seats on tank head flange 30.

5           An alternate connection 12a to a side of a tank 10a, is seen in FIGS. 4-7. The connection 12a is designed to hold a flexible liner 62 in place within tank 10a by threading studs 64 on plate 66 through holes 68 in flexible liner 62. A liquid conduit tube 70 mounted through plate 66 passes through annular  
10           hole 72 in the flexible liner 62. An O-ring 74 seals the connection between plate 66 and flexible liner 62. The liner 62 is press fit against an inner surface of tank wall 60 by passing studs 64 and tube 70 through a threaded insert 76 having receiving holes 78 for the studs 64 and hole 88 for tube  
15           70. A threaded pipe 80 is welded 82 to the tank outer wall 60 around an annular hole 84. The studs 64 and tube 70 are held in place by nuts 86 attached to the ends of studs 64. By tightening down on threaded insert 76 the flexible liner 62 is pulled tightly against an inner surface of tank wall 60  
20           adjacent the hole 84. By removing fasteners 86 and unthreading insert 76, the connection 12a can be easily removed and the flexible liner 62 thereafter removed from the inside of tank 10a.

No separate liner lip is needed as in the prior art.

This invention has adaptability for potable hot water tanks or other tanks containing liquids compatible with the liners 22 or 62.

Other equivalent elements can be substituted for the connection elements set forth above to produce substantially the same results in substantially the same way.